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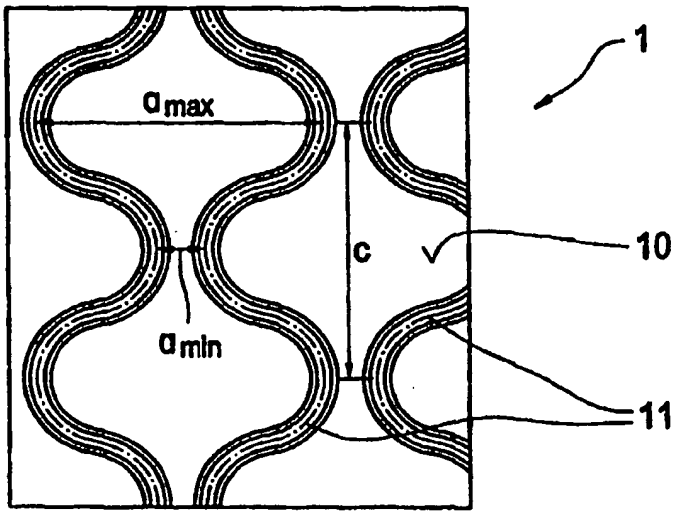
(54) **TRANSPORTEUR A COURROIE A SURFACE PROFILEE, AINSI QUE PROCEDE POUR LE RACCORD DES DEUX EXTREMITES D'UN TEL TRANSPORTEUR A COURROIE**

(54) **CONVEYOR BELT WITH A SHAPED SURFACE AND METHOD FOR JOINING THE TWO ENDS OF SUCH A CONVEYOR BELT**



(57) L'invention concerne un transporteur à courroie (1) à surface profilée (10) pour le transport de marchandises pouvant rouler. La surface (10) du transporteur à courroie présente plusieurs nervures (11) continues, ondulées dans le sens longitudinal et ne se touchant pas. L'agencement des nervures (11) selon l'invention évite les points d'intersection; ainsi, le transporteur à courroie (1) est plus souple et tend moins que les transporteurs à courroie traditionnels aux imperfections et aux défauts dus à de tels points d'intersection.

(57) The invention relates to a conveyor belt (1) which has a shaped surface (10) for conveying rolling items. The conveyor belt surface (10) has several continuous ridges (11) which undulate in the longitudinal direction and do not touch each other. Owing to the arrangement of the ridges (11) provided for by the invention there are no points of intersection, which makes the conveyor belt (1) more flexible and less prone to defects and errors caused by such points of intersection than conventional shaped conveyor belts.

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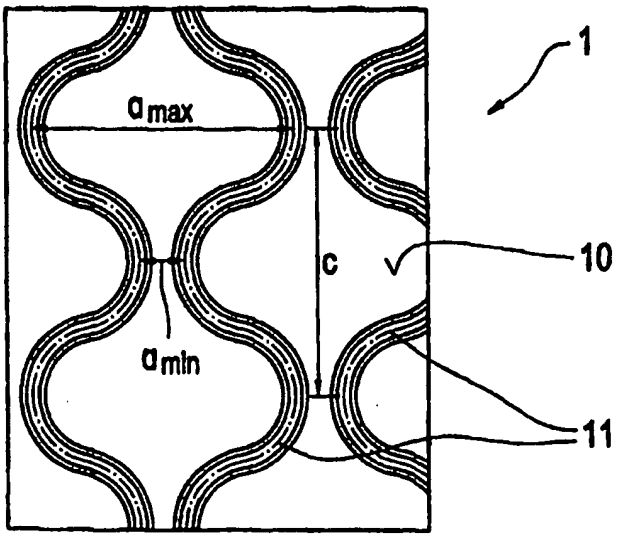
(54) Title: CONVEYOR BELT WITH A SHAPED SURFACE AND METHOD FOR JOINING THE TWO ENDS OF SUCH A CONVEYOR BELT

(54) Bezeichnung: TRANSPORTBAND MIT PROFILIERTER OBERFLÄCHE SOWIE VERFAHREN ZUM VERBINDEN DER BEIDEN BANDENDEN EINES SOLCHEN TRANSPORTBANDES

(57) Abstract

The invention relates to a conveyor belt (1) which has a shaped surface (10) for conveying rolling items. The conveyor belt surface (10) has several continuous ridges (11) which undulate in the longitudinal direction and do not touch each other. Owing to the arrangement of the ridges (11) provided for by the invention there are no points of intersection, which makes the conveyor belt (1) more flexible and less prone to defects and errors caused by such points of intersection than conventional shaped conveyor belts.



(57) Zusammenfassung

Ein erfindungsgemässes Transportband (1) ist mit einer profilierten Oberfläche (10) zur Beförderung von rollfähigem Transportgut versehen. Die Transportbandoberfläche (10) weist mehrere kontinuierliche, in Längsrichtung wellenförmig verlaufende Stege (11) auf, die sich nicht berühren. Durch die erfindungsgemässe Anordnung der Stege (11) treten keine Kreuzungspunkte auf, wodurch das Transportband (1) flexibler und weniger anfällig für Störstellen und Fehler ist, die von solchen Kreuzungspunkten ausgehen, als die herkömmlichen profilierten Transportbänder.

Transport belt with profiled surface

The present invention relates to a transport belt with a profiled surface, which has a thermoplastic layer into which the transport belt surface is embossed, and to a method of joining the two belt ends of such a transport belt.

Transport belts with a profiled surface are used, for example, for conveying luggage at airports, agricultural products, such as potatoes or root vegetables, or other coarse bulk material. Such transport belts have to be constructed in such a way, and their surface has to be configured in such a way, that they exhibit the following characteristics:

- ensuring that transport goods that can roll, such as suitcases with rollers, potatoes, root vegetables and other coarse bulk material will be carried along, coarse in this connection meaning that the smallest diameter is at least 5 mm;

- preventing large relative movements between the transport belt and transport goods during acceleration and braking; and

- possible use in rising and falling transport paths, without the transport goods rolling around to a large extent on the transport belt.

Conventional transport belts with these characteristics are generally distinguished by a surface with an embossed grid pattern. The webs of the grid pattern are between 2 and 5 mm high, about 3 to 10 mm wide and generally form squares or lozenges with an edge length between 20 and 100 mm.

Fig. 1 illustrates an example of such a transport belt 1' with a transport belt surface 10' and webs 11'. The webs 11' taper from the foot toward the tip. A transport belt of this type is known, for example, from the company publication "Profiles for PVC belts" from Ammeraal International BV, Heerhugowaard, Netherlands.

In order to produce such transport belts, use is generally made of fabrics as a substrate, on to which soft PVC, thermoplastic polyurethane or other thermoplastic elastomers are applied by the spread-coating or cast-coating processes. A number of such coated fabrics can be joined in a lamination process to form multi-layer elements. Transport belts having one, two or more fabric layers are conceivable. In order to be able to implement the surface embossing described above, it must be ensured that the thermoplastic layer to be profiled is sufficiently thick. The embossing of the transport belt surface is carried out directly after the coating or laminating, or in a separate procedure in an embossing station provided for the purpose.

Fig. 2 illustrates the embossing of a transport belt surface in an embossing calendar 8 with a vertical roll arrangement. A transport belt 1' is led over a spreader 81 and a turn roller 82 into the nip between a cooled embossing roll 83 and a rubber-covered back-pressure roll 84 and then wraps around the embossing roll 83. Directly upstream of the nip, the thermoplastic layer to be embossed is heated to forming temperature or above, using infrared radiators 89. The desired profiling is then impressed by means of the engraved embossing roll 83, the pressure needed for this purpose being ensured by the rubber-covered back-pressure roll 84. The back-pressure roll 84 can be cooled by means of a cooling roll 85 which dips partially in to a cooling tray 86 filled with cooling liquid. By cooling down the thermoplastic layer, the embossed surface profiling is fixed. The transport belt 1' then passes over turn rollers 90 to cooling cylinders 87, 88 and is led around the latter for further cooling and finally led away over a turn roller 91.

In the grid-pattern embossing geometry described above, the webs form crossing points which have disadvantageous effects on the transport belt. The crossing points lead to stiffening of the transport belt, which increases the bending resistance and has a detrimental effect on the minimum permissible roller diameter. In addition, during the production of the embossing, voids can be produced at the crossing points forming starting points for cracks and fracture points in the webs and resulting in a poor visual quality.

In view of the disadvantages of the previously known profiled transport belts described above, the invention is based on the following objective. A transport belt with a profiled surface of the type mentioned at the beginning is to be provided whose webs effect considerably lower belt stiffening and which can be produced with fewer faults, in particular voids. In addition, the transport belt is to have good entrainment characteristics and is to exhibit the property that no rattling noise is produced at turn rollers which act on the belt surface.

This object is achieved by the transport belt according to the invention as defined in the independent patent claim 1. Preferred design variants emerge from the dependent patent claims. A method, according to the invention, of joining the two belt ends is defined in patent claim 9, and a use, according to the invention, of such a transport belt is defined in patent claim 10.

The essence of the invention is that, in a transport belt with a profiled surface that has a thermoplastic layer into which the transport belt surface is embossed, the transport belt surface has a plurality of continuous nonlinear webs which extend in the longitudinal direction and do not touch one another.

As a result of the arrangement of the webs according to the invention, no crossing points occur, as a result of which the transport belt is more flexible and is less susceptible to disruptions and faults which originate from these than the conventional profiled transport belts. The continuously extending webs prevent the incorporation of faults, for example air inclusions, during the embossing operation. The lack of dead corners additionally prevents the accumulation of dirt and increases the ease of cleaning.

As a result of the fact that the webs extending in the longitudinal direction do not touch one another, any liquid which gets on to the transport belt can flow away between the webs, whereby accumulations of liquid on the transport belt surface are avoided.

Since the webs are continuous and not interrupted in the longitudinal

direction, they rest permanently on any rollers and do not produce any rattling noise.

In a preferred design variant, the two belt ends of a transport belt according to the invention are joined to each other in such a way that the webs extend continuously over the joining zone. As a result, the production of a rattling noise is avoided even in the joining zone.

In the following text, the transport belt according to the invention and the method, according to the invention, of joining the two belt ends of a transport belt will be described in more detail with reference to the appended drawings and using three exemplary embodiments. In the drawings:

Fig. 3 - shows a plan view of part of a first exemplary embodiment of a transport belt according to the invention having wave-like webs;

Fig. 4 - shows a section through part of the transport belt of Fig. 3;

Fig. 5 - shows a plan view of part of a second exemplary embodiment of a transport belt according to the invention having zigzag-like webs with slightly rounded corners;

Fig. 6 - shows a plan view of part of a third exemplary embodiment of a transport belt according to the invention having zigzag-like webs with very rounded corners;

Fig. 7 - shows a schematic view of a finger joint between the two belt ends of a transport belt according to Fig. 5, and

Fig. 8 - shows a plan view of a detail of the two joined belt ends from Fig. 7.

Figures 3 and 4

The transport belt 1 illustrated has two fabric layers 3 and 4 which are

coated with a thermoplastic and have been combined to form one element in a lamination process. The thermoplastic used can be the thermoplastics known from the conventional transport belts, in particular PVC or polyurethane. The transport belt surface 10 with webs 11 is embossed into the upper thermoplastic layer 2.

The webs 11 extend in a wave shape and are of mirror image formation with respect to the longitudinal direction of the transport belt 1. They have a height h between 2 and 10 mm, a lower web width b_2 between 2 and 12 mm, an upper web width b_1 between 2 and 12 mm and, in the present case, a trapezoidal cross section. The minimum distance a_{min} between two adjacent webs 11 is between 3 and 50 mm, and the maximum distance a_{max} is between 15 and 200 mm. The distance c between two adjacent points with the minimum web spacing a_{min} is between 15 and 200 mm.

The production of the transport belt 1 with a profiled surface 10 can be carried out by means of the known process, for example as described at the beginning.

The following definition applies to the whole of the subsequent description. If a figure contains reference symbols for the purpose of clarity in the drawing, but these reference symbols are not explained in the directly associated descriptive text, then reference is made to their explanation in the preceding figure descriptions.

Figure 5

The transport belt 101 illustrated has a transport belt surface 110 with webs 111 that extend in a zigzag shape and have slightly rounded corners; otherwise, that which was said in connection with Figs. 3 and 4 applies.

Figure 6

The transport belt 201 illustrated has a transport belt surface 210 with webs 211 that extend in a zigzag shape and have very rounded corners;

otherwise, that which was said in connection with Figs. 3 and 4 applies.

Figures 7 and 8

The two belt ends 105 and 106 of the transport belt 101 are joined to each other in the manner of fingers in such a way that the transport belt surface 110, including the webs 111, extend continuously over the joining zone 107.

The transport belt 101 can be made endless by using a method, according to the invention, of joining the two belt ends 105 and 106, which comprises the following steps:

a) Stamping out complementary zigzags at the two belt ends 105, 106;

b) Intermeshing the two belt ends 105, 106;

c) Laying an engraved metal plate on to the joining zone 107 of the two belt ends 105, 106, the engraving corresponding to the surface geometry of the transport belt 101 in the joining zone 107; and

d) Pressing the metal plate against the transport belt 101 while supplying heat, which is normally done in an end-joining press.

The actions of stamping out the zigzags at the two belt ends 105, 106 must be coordinated with one another in such a way that when the two belt ends 105, 106 are intermeshed in the joining zone 107, a continuous profile is produced. This necessitates the complementary arrangement of the zigzags with respect to the surface geometry at the two belt ends 105, 106. In order to restrict the spread of necessary engraved metal plates, the number of permitted zigzag arrangements with respect to the surface geometry is advantageously restricted to 3 to 5.

By pressing the metal plate against the transport belt 101 while supplying heat, the intermeshed belt ends 105, 106 are welded together. At the same time, the engraving of the metal plate is transferred to the transport belt 101, and the interruption to the profiling in the joining zone 107 disappears.

Further design variations of the above-described transport belts can be implemented. Reference should also be made expressly here to the fact that irregular web wave forms are also conceivable.

Patent Claims

1. A transport belt (1; 101; 201) with a profiled surface (10; 110; 210) that has a thermoplastic layer (2) into which the transport belt surface (10; 110; 210) is embossed, wherein the transport belt surface (10; 110; 210) has a plurality of continuous nonlinear webs (11; 111; 211) which extend in the longitudinal direction and do not touch one another.

2. The transport belt (1) as claimed in claim 1, wherein the webs (11) extend in a wave shape, especially sinusoidally.

3. The transport belt (101; 201) as claimed in claim 1, wherein the webs (111; 211) extend essentially in a zigzag shape, the corners being rounded.

4. The transport belt (1; 101; 201) as claimed in one of claims 1 to 3, wherein two adjacent webs (11; 111; 211) are of mirror-image formation with respect to the longitudinal direction of the transport belt (1; 101; 201).

5. The transport belt (1; 101; 201) as claimed in one of claims 1 to 4, wherein the webs (11; 111; 211) are between 2 and 10 mm high and between 2 and 12 mm wide and can have a trapezoidal cross section.

6. The transport belt (1; 101; 201) as claimed in one of claims 1 to 5, wherein the minimum distance (a_{min}) between two adjacent webs (11; 111; 211) is between 3 and 50 mm, and the maximum distance (a_{max}) is between 15 and 200 mm.

7. The transport belt (1; 101; 201) as claimed in one of claims 1 to 6, wherein it has at least one fabric layer (3, 4) on which the thermoplastic layer (2), which may be made in particular of PVC or polyurethane, is arranged.

8. The transport belt (101) as claimed in one of claims 1 to 7, wherein its two belt ends (105, 106) are joined to each other in such a way that the webs

(111) extend continuously over the joining zone (107).

9. A method of joining the two belt ends (105, 106) of a transport belt (101) as claimed in one of claims 1 to 7 in order to produce a transport belt (101) as claimed in claim 8, which comprises the following steps:

a) Stamping out complementary zigzags at the two belt ends (105, 106);

b) Intermeshing the two band ends (105, 106);

c) Laying an engraved metal plate on to the joining zone (107) of the two belt ends (105, 106), the engraving corresponding to the surface geometry of the transport belt (101) in the joining zone (107); and

d) Pressing the metal plate against the transport belt (101) while supplying heat.

10. The use of a transport belt (1; 101; 201) as claimed in one of claims 1 to 9 for conveying luggage or coarse bulk material, such as potatoes or root vegetables.

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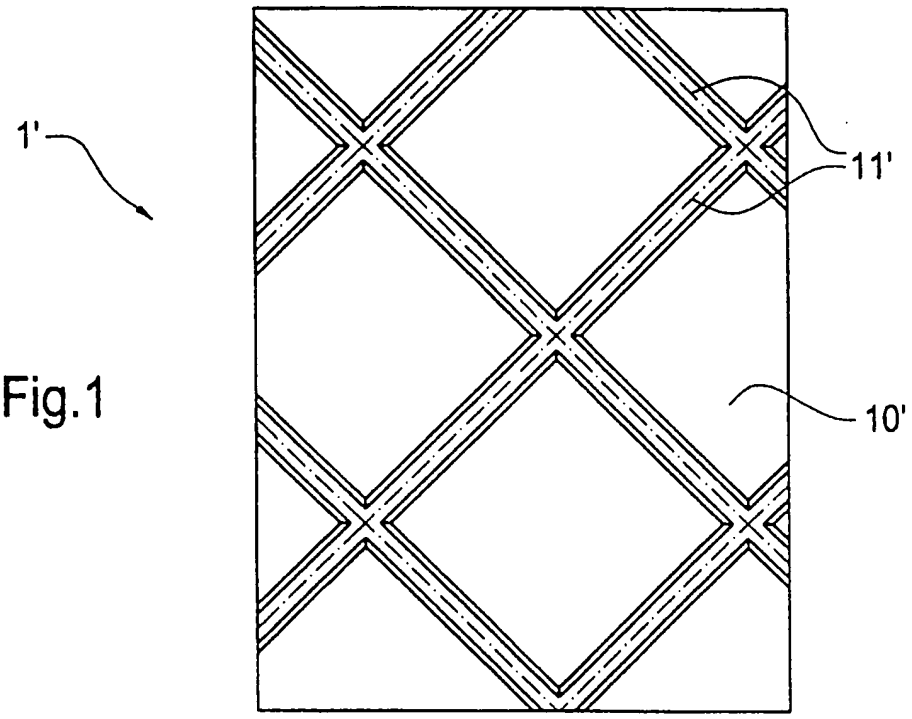


Fig.1

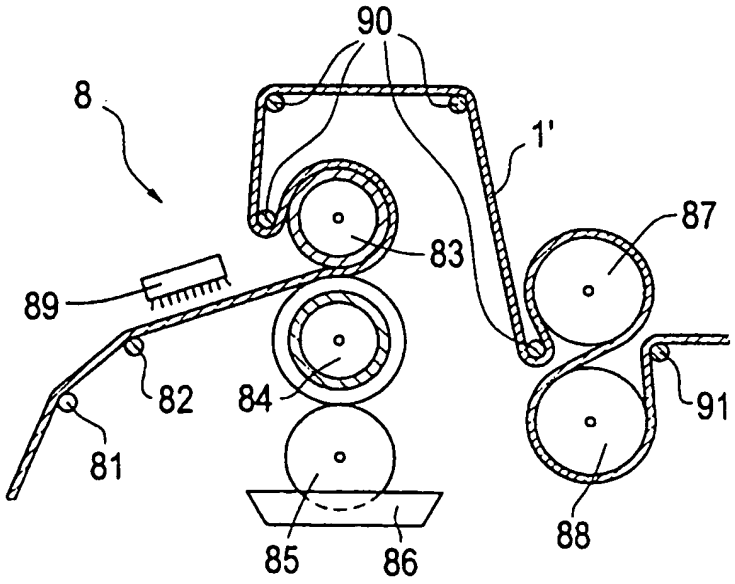


Fig.2

Fig.3

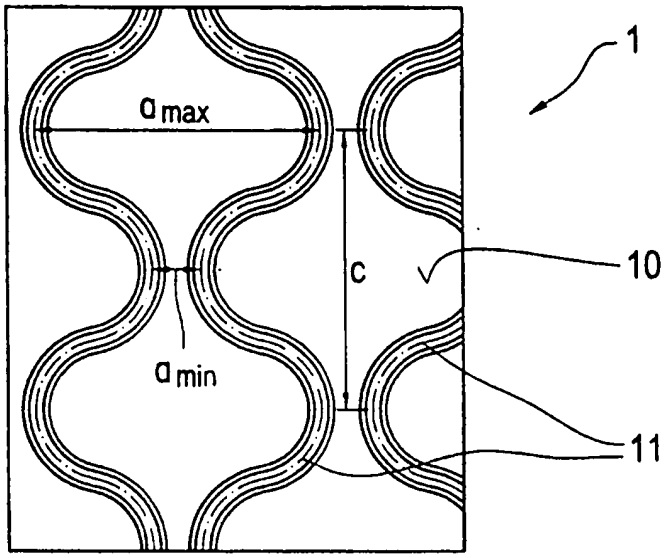


Fig.4

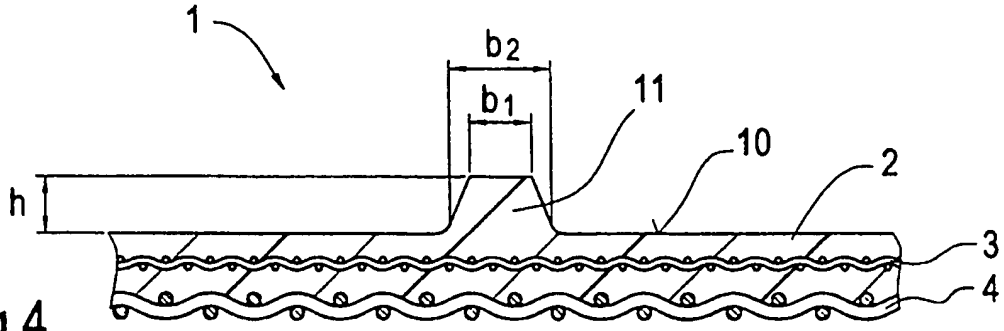
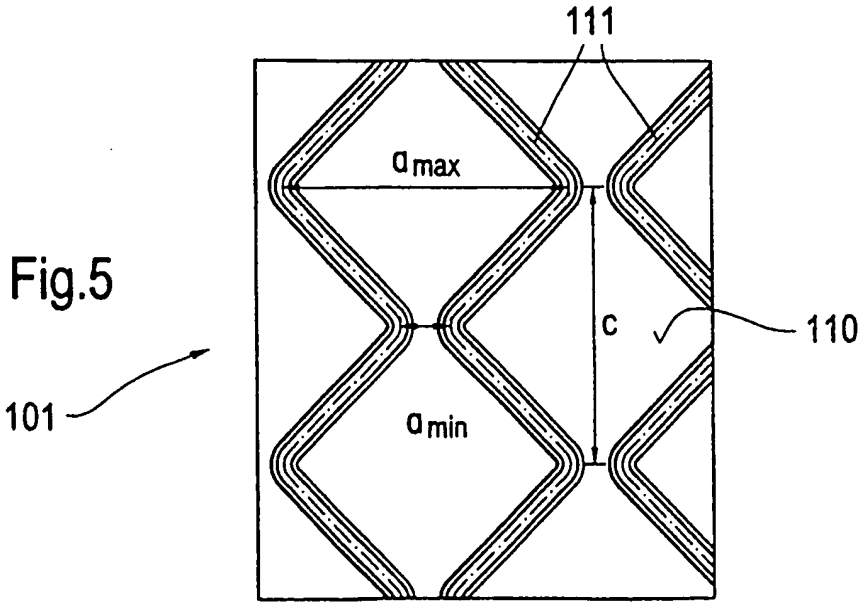


Fig.5



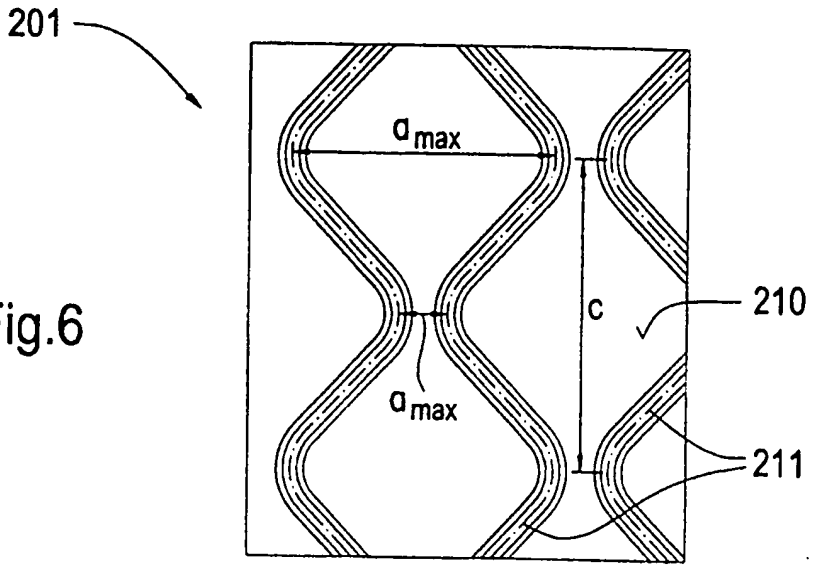


Fig.6

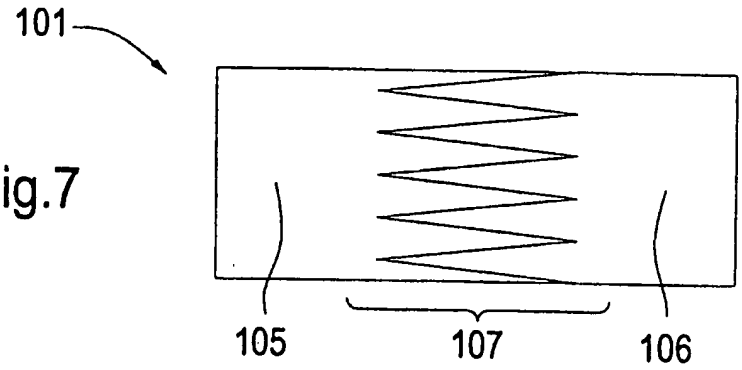


Fig.7

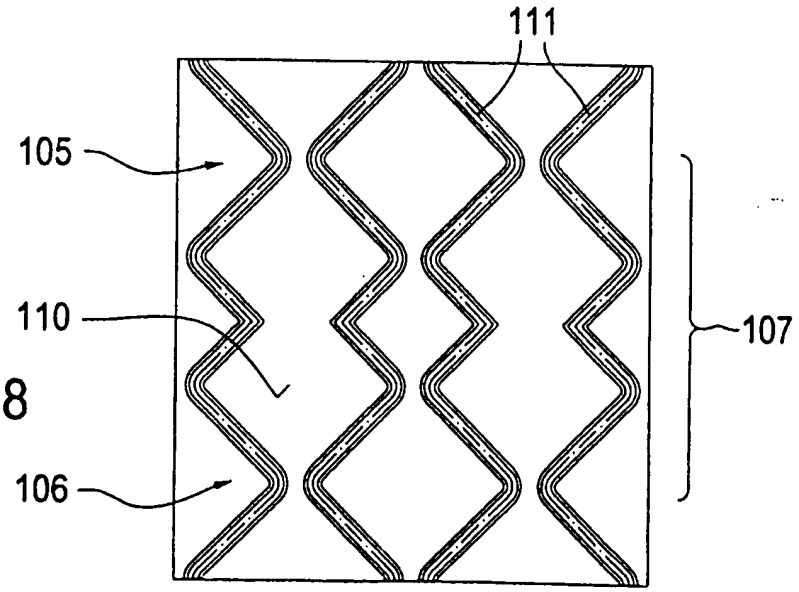


Fig.8